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Chapter 26. Water-Dependent Recreation

A Multitude of Recreation Opportunities

With its temperate climate, over 1.3 million acres of water surface, 2,600 miles of waterways, and 3,427 miles of coastline, California offers a variety of water-dependent recreation opportunities in any season. Each year millions of California residents and visitors come to California water bodies seeking recreation experiences. In 2010, beach and waterfront activities helped make California one of the most visited states in the nation.

California residents and visitors can choose from a variety of *water-dependent* recreation activities. They may enjoy recreation activities in or on water, including fishing, swimming, waterfowl hunting, motor boating, canoeing, and kayaking. They also may participate in recreation activities that can be enhanced by water, such as wildlife viewing including birding, picnicking, relaxing on the beach, camping, and hiking, biking, and horseback riding on trails. While the latter activities do not require water, they are frequently enjoyed near waterways, lakes, floodways and the sea.

Californians Value Water-dependent Recreational Opportunities

A number of surveys validate the importance of water in Californians' outdoor recreation activities. For example, the 2007 survey of Public Opinions and Attitudes on Outdoor Recreation in California, conducted by California State Parks every 5 years to better understand residents' recreation habits, found that 59% of California's adults participated in beach activities, 31% swam in freshwater lakes, rivers, and/or streams, and 21% fished in fresh waters (CSP, 2009a, 2009b, 2009c). Over 39% used a beach or water recreation area during their most recent park visit. Significant numbers also enjoyed water-enhanced nature-based activities such as wildlife viewing (47%), hiking on trails (46%), and camping in developed sites (39%) (CSP, 2009a).

The same survey also reveals the importance of recreation facilities at lakes, rivers, and reservoirs: about 60% indicated that recreation facilities, such as day-use, picnic, or camping sites are needed at lakes and reservoirs. And 78% felt that the government should place more emphasis on cleaning up pollution of the ocean, lakes, rivers, and streams in park and recreation areas. In the 2002 survey, about 79% of the respondents indicated that the availability of lakes, reservoirs, rivers, and wetlands was an important factor in their overall enjoyment of their favorite recreation activity.

Public agencies might consider the following value statements which may guide water recreation planning and programming:

- California has a strong outdoor recreation legacy because of its pleasant climate, natural beauty, geographic diversity, fish and wildlife resources, and bountiful open space.
- Open space lands set aside for water resource protection, storage or extraction are often suitable for joint recreational use. These include protected watershed lands, floodways and reservoirs.

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- Providing recreational opportunities that draw Californians outside increases public health, a significant State and local government responsibility, (<http://www.parks.ca.gov/pages/795/files/2009-2014%20corp-trends%20and%20challenges.pdf> and <http://www.parks.ca.gov/pages/795/files/recpolicy.pdf>)
- Generations of Californians have, and will, benefit from laws protecting the public's access to navigable waterways and ocean beaches.
- Including safe access to waterways where feasible increases public safety.
- Maintaining the affordability of recreational opportunities allows more Californians to engage in healthy outdoor activities. (<http://www.parks.ca.gov/pages/795/files/benefits%20final%20online%20v6-1-05.pdf>)
- Recreation and tourism are economic engines that improve the quality of life, increase property values and provide jobs for many Californians. (<http://www.parks.ca.gov/pages/795/files/ca%20outdoor%20rec%20econ%20study-statewide%2011-10-11%20for%20posting.pdf> and http://www.parks.ca.gov/pages/795/files/nov%202011%20capp_final_11_29_11.pdf)
- The California Children's Outdoor Bill of Rights, states that "Every child should have the opportunity to: explore nature, learn to swim, go fishing, go boating" and six other recreation activities. (www.calroundtable.org/files/BOOKMARK%202012.pdf)

Water Managers' Role in Recreation Planning

By incorporating planning for water-dependent recreation activities in water projects, water managers play a critical role in ensuring that Californians today and into the future are able to enjoy such activities. For example, acquiring land for picnic tables, boat ramps and trails near a planned reservoir can increase the economic and social sustainability of the project.

Demand for outdoor recreation opportunities in many parts of California exceeds the capacity of the current infrastructure (<http://www.parks.ca.gov/pages/795/files/2009-2014%20corp-trends%20and%20challenges.pdf>). As a result, facilities are likely to be overused, jeopardizing natural and cultural resources on which they depend, and degrading the recreational experience.

Furthermore, as California's population continues to grow, public demand for water-dependent recreation opportunities will only increase. Today's population of 39 million is estimated to reach 49 million by 2030 and almost 59.5 million by 2050 (DOF, 2012).

Providing for recreation in water projects is part of California law and the California Public Trust Doctrine.

- California's 1961 Davis-Dolwig Act requires state agencies involved in water projects to integrate recreation facilities as well as fish and wildlife enhancement. The Act outlines responsibility for project costs allocated to recreation, fish and wildlife enhancement and for costs of acquiring property for recreation development.
- The California Coastal Act, managed by the California Coastal Commission, protects public access to the coastline and tidelands.
- The California Public Trust Doctrine, guarded by the State Lands Commission, recognizes recreation as a public trust use of water that state agencies must consider when managing tidelands and navigable waters and their tributaries (SLC, 2001, 2009).

- Recreational access along navigable waterways is a longstanding State interest, as follows:
...the Legislature hereby finds and declares that there is a statewide and continuing interest in the public's use of the state's inland waterways for recreational purposes. The Legislature further finds and declares that there exists a need to provide for recreational resource planning of the waterways in a manner that provides access and utilization for recreational purposes... (Harbors and Navigation Code Section 68-68.2).

If water managers and recreation professionals work together, they can provide many more opportunities for water-dependent recreation to meet the demand of California's residents and visitors now and into the future.

Potential Benefits of Water-Dependent Recreation

Residents and visitors flock to California's beaches, reservoirs, lakes, floodways, waterways and snow-covered mountains for a variety of fun and healthy outdoor activities. Recreation provides a myriad of benefits, not only to individuals but to communities, the environment, and the economy.

Health, Social and Environmental Benefits

Swimming, kayaking, and water skiing are just a few of the vigorous, fun and healthy activities available at outdoor recreation areas. By offering opportunities for outdoor exercise, government agencies and other entities can help counteract significant negative health trends, such as the increase in childhood obesity. (<http://www.parks.ca.gov/pages/795/files/2009-2014%20corp-trends%20and%20challenges.pdf>)

Other, less vigorous outdoor recreation activities refresh and relax mind and body, reducing stress and improving health. Recreationists enjoy paddling in inner tubes, sunbathing or playing on beaches, telling stories around a waterfront campfire, strolling near rivers, creeks and marshlands, and photographing wildlife and plants. These opportunities also provide the public a means to adapt to increasing temperatures brought on by climate change. Local recreational areas that have water and shade create a micro-climate that reduces the heat island effects of urbanization. Having access to such areas helps residents cope with heat stress.

In addition to providing the chance for exercise and relaxation, recreation offers a variety of other social benefits to individuals, communities and the environment. For example:

- A family picnicking at a popular reservoir enjoys socializing with family and friends while sharing the recreation area with other visitors of many ages, races and creeds. Leisure experiences such as these help improve cultural understanding and strengthen social bonds.
- A young couple observing nature as they walk or bike along a shady path near a river is making a meaningful connection with the natural environment. Such activities encourage an appreciation for water resources and wildlife. In turn, this can lead to an increase in volunteerism and stewardship of natural resources and help strengthen communities.
- Led by an interpretive specialist, a boy and his classmates learn about the importance of watersheds and water-related environments, and explore ways they can save water at home. Experiences such as these enrich formal education, instill life-long positive values, deter irresponsible behavior and help meet the State's commitment to wise use of water resources.

- Riverbanks, lakeshores and beaches, because of their linear nature, offer excellent opportunities to provide non-motorized recreational and commuter trail routes with fewer motorized traffic conflicts. These routes provide a healthy, affordable and nonpolluting transportation option for schoolchildren and adults, which may reduce short and mid-range auto trips and improve air quality.

A water resources facility that illustrates how water-dependent recreation opportunities can provide health, social and environmental benefits is Sacramento's American River Parkway that parallels about 30 miles of the American River downstream of Folsom Dam. Visitors may participate in a variety of activities – they walk, run, bike, or horseback ride, picnic, fish, swim, watch wildlife and paddle along a boating trail. The Parkway also provides access to a rowing facility and a fish hatchery where visitors can view salmon and steelhead trout (County of Sacramento, 2009), and is a popular bicycle commuting route.

Economic Benefits

Water-dependent recreation has a major influence on California's economy. In 2008, the estimated direct and indirect economic benefit of recreational boating alone was more than \$19 billion. As one of the most popular recreational pursuits among California travelers, water-dependent recreation helped attract millions of tourists to California in 2010, making it one of the most visited states in the nation. During 2010, travel spending in California directly supported 873,000 jobs with earnings of \$30 billion. Travel spending generated the greatest number of jobs in arts, entertainment and recreation (226,000), and accommodation and food services (520,000).

(<http://www.parks.ca.gov/pages/795/files/ca%20outdoor%20rec%20econ%20study-statewide%2011-10-11%20for%20posting.pdf>)

Commercial businesses offering recreation equipment, programs, and services also boost local economies and create jobs. For example, visitors to Sacramento County's American River Parkway frequently combine a trip to the parkway with eating and shopping at local businesses. Such activities generate about \$260 million annually for the local economy. (TPL)

Water-dependent recreation generates economic value from lands unsuitable for other uses, such as those subject to frequent flooding or set aside for watershed protection. This increases the benefits of protected open spaces and view sheds, prompts long-term investments in more livable communities and increases adjacent property values. Communities with significant tourism resources, such as San Diego's beaches, can generate revenue from tourism taxes such as hotel occupancy fees. Communities with significant recreation resources, such as many in Marin County, enjoy generous tax revenues from higher property values. Some park districts gain public support for parcel taxes, such as East Bay Regional Park District, that fund open space preservation and recreational development.

Water-dependent recreation also generates significant revenue for the state through fees, permits and licenses:

- In 2010, 808,649 boats were registered in California generating nearly \$2 billion for the state.
- Sales of sport fishing and hunting licenses and stamps generated more than \$81 million in revenue for the Department of Fish and Game in 2011. Fishing-related expenditures are included in Table 26-1 (DFG, 2012).

- In 2006, 7.4 million residents and nonresidents 16 years and older fished, hunted, or watched wildlife—spending a total of \$8 billion.

PLACEHOLDER Table 26-1 Fishing Statistics in California, 2006

[Any draft tables, figures, and boxes that accompany this text for the advisory committee draft are included at the end of the chapter.]

Value-Added Benefits From Flood Management Projects

Flood protection facilities provide opportunities for integrating suitable recreation facilities, such as trails, picnic sites, wildlife viewing areas and water trail launching sites. Establishing greenways as part of flood management projects and replacing concrete channels with more natural creek environments meet recreation demand in urban areas. For example:

- The Tujunga Wash Greenway and Stream Restoration Project is a good example of a value-added project in the San Fernando Valley. The project will provide open space for recreation, improved water quality, and groundwater recharge by diverting water from the concrete channel into a naturalized streambed.
- The Napa River Flood Management Project includes a user-friendly environment with greenways, walking paths, trails and open space.
- Lake Elizabeth in Fremont is a critical component of the local flood management program and includes a natural setting with many recreation attributes designed around an urban area.

Funding can be generated by including flood management projects and recreation development in urban development or redevelopment projects. Modern urban design that includes both recreational and natural flood management components increases the desirability and property values of these neighborhoods. The City of Folsom’s Parkway neighborhood added trails and parkland along its floodway.

Value-Added Benefits From Climate Change Projects

Water-dependent recreation complements adaptation and mitigation strategies to address climate change, while making communities more resilient to it. As indicated in the climate change section later in this chapter, this type of recreation provides multi-value added benefits, such as mitigating emissions of greenhouse gases, while also decreasing pollutants in waterways. Protected watershed lands, greenways along waterways, floodways and flood bypasses, marshes and seashores can provide room to implement both climate change mitigation and climate adaptation strategies. Incorporating recreation improves the economic sustainability and social benefits of these land uses.

Climate change mitigation strategies can include planting vegetation to sequester carbon while creating an inviting recreation area. Increasing paddling opportunities encourages less fuel-intensive recreation while providing boat storage at recreation sites reduces fuel-intensive transportation. Providing commuter bikeways and neighborhood trails along natural or constructed waterways can reduce vehicle miles traveled and greenhouse gas generation, especially for short trips. When Californians can safely and comfortably traverse their neighborhoods on foot or on bike, fewer and smaller motor vehicles are necessary – which allows more compact communities with smaller garages, narrower streets, less energy use and less fuel transportation infrastructure. For example,

- An escalation of gasoline prices created a measurable spike in bicycle commuters using the American River Parkway as a travel alternative. The parkway's trails connect to paddle and sail boat rental facilities at Willow Creek and Lake Natoma, allowing local recreationists to walk or ride bicycles to enjoy boating at these lakes. (TPL)
- Climate adaptation strategies include the provision of buffer lands to accommodate increased storm run-off and rising seas. Greenways and beaches subject to periodic flooding are suitable for recreation, so they can generate revenue and improve the livability of communities. Greenways can be designed to connect habitats, giving native species adaptation corridors, and are often suitable for stormwater infiltration which increases local water self-sufficiency. These are discussed in more detail below.

Potential Costs of Water-Dependent Recreation

Information is not readily available on the statewide costs of providing and operating public water-dependent recreation opportunities to accommodate population growth and climate change. Public investments are necessary to provide affordable recreational opportunities for all Californians. Significant investments in waterside recreation facilities are also made by individuals, businesses and not-for-profit associations, such as private docks, marinas, boat-in restaurants, marine services and duck clubs. Below are some examples of facility development costs:

- The required FERC relicensing Protection, Mitigation, and Enhancement (PM&E) measures typically cost \$25 per kilowatt (kW) capacity of a hydroelectric project for wildlife, \$95/kW for fisheries, and \$22/kW for recreation. PM&E measures benefiting wetlands, aesthetics, cultural resources, and water quality cost about \$24/kW. Recreation facilities include boat ramps, canoe portages, hiking trails, and fishing access areas as well as operational changes to augment downstream flows to protect and enhance fisheries and create recreational opportunities, such as whitewater boating, and hydropower education programs. These funds may also be used to operate and maintain facilities.
- Between 2007 and 2012, the Department of Boating and Waterways funded \$24 million in 43 boating facility projects, \$85,000 to \$3.25 million, on State lands. During this time period, the Department also provided local assistance funding of \$57 million in grants and about \$65 million in loans for the rehabilitation and construction of local boating facilities, including marinas and boat launching facilities. Typically, improvements included adding launching ramps, parking lots, boarding floats, restrooms/floating restrooms, lighting, berthing, moorings, boat-in day-use, and camping/RV sites. \$26 million was provided for local assistance funding for beach erosion control and protection infrastructure projects. (DBW, correspondence May 8, 2012)
- The Tujunga Wash Greenway and Stream Restoration stream channel diversion project mentioned above cost \$7 million to complete, providing multiple benefits.

- A Sacramento-San Joaquin Delta Boating Needs Assessment 2000-2020 estimated that repairing or replacing the existing public and private facilities in all six Delta zones would cost between \$107 million and \$159 million, spread over 20 years (Cal Boating, 2003).
- The 2002 California Boating Facilities Needs Assessment surveyed 646 of California's boating facilities which included marinas, launch ramps, dry storage facilities, resorts, recreational areas, and yacht clubs. Table 26-2 provides projected costs for just the launch ramp improvements. Almost 60 percent of the 385 launch facilities surveyed identified upgrade would be needed within ten years, while 20 percent had no upgrades identified. The balance did not know if they needed upgrades or not, so the cost figures provided here are low compared to potential needs (CSUS, 2002).

PLACEHOLDER Table 26-2 Estimated Launch Ramp Facility Costs

[Any draft tables, figures, and boxes that accompany this text for the advisory committee draft are included at the end of the chapter.]

Operation and maintenance costs vary with each facility and its individual characteristics. Operational costs include public safety and maintenance staff, electrical and water utility costs, vehicles and equipment, and more. Facility replacement and repair needs can include docks/slips, dry boat storage, launch ramp lanes, parking lots, pump stations, restrooms, and transient docks. Maintenance of infrastructure to service facilities, such as utilities, roads, channels and trails, is also necessary. Maintenance costs, especially in remote areas, are not easily estimated and no statewide analysis has been prepared. Even the statewide California Boating Facilities Needs Assessment survey found that 25 percent of the respondents could not provide cost estimates. As these facilities get upgraded, one must also factor in the cost for adapting to the impacts from climate change so that these facilities can be resilient to environmental changes, such as rises in sea level. Examples of operations and maintenance costs include:

- In 2008, the Department of Parks and Recreation spent \$162,000 on housekeeping and operating costs for the Lake Oroville State Recreation Area's 84 boat-in campsites and \$137,000 maintaining its 74 miles of non-motorized trails.
- Between 2007 and 2012, the Department of Boating and Waterways provided about \$80 million for local boating law enforcement, including personnel, boats, equipment, training; and grants for abandoned vessel removal and vessel surrender. Boating and Waterways provided \$40 million in boating education and safety programs statewide, including to schools and the general public (including school curricula and life-jacket programs), aquatic center grants for classroom and on-the-water safety education to universities, colleges, and local entities, boating safety education multimedia campaign, and boating clean and green education. The Department treated tens of thousands of acres in the Delta at a cost of \$30 million to control the growth of the aquatic invasive weeds, *Egeria densa* and water hyacinth. (DBW, correspondence May 8, 2012)
- The Sacramento-San Joaquin Delta Boating Needs Assessment 2000–2020 estimated it would cost \$27 per square foot to make extensive repairs to an existing marina (Cal Boating, 2003).
- The California Boating Facilities Needs Assessment noted that estimates for dredging costs varied widely, depending on factors such as tidal flows, location and dredge disposal options. Estimated costs per cubic yard ranged from \$10 to over \$50 and costs of \$1,000,000 or more per facility were not uncommon (CSUS, 2002).

Research to identify California’s recreational trends is necessary to understand the demand and efficiently make facility investments that meet the state’s recreation needs. A recent Department of Parks and Recreation survey of state park visitors cost over \$500,000.

Major Issues Facing Water-Dependent Recreation

Lack of Access

Californian’s navigable waterways are a Public Trust resource and boating along those waterways is a long standing right. In many areas, however, it may be difficult to find boating access points. Paddle boats, in particular, need safe launching and take-out areas in locations that allow them to avoid in-stream water infrastructure and hazardous areas. Without clear signage, bank anglers may find it difficult to determine whether they are traversing or standing on private or public land, leaving them subject to charges of trespass. Even public lands along waterways, such as road rights-of-way, often do not provide clearly identified, safe access.

Anticipated changes in demographics, population, and types of use may stress the capacity of water-dependent recreation resources. Population growth, if accompanied by static recreation opportunities, may cause overcrowding at existing recreation areas. The Central Valley, for example, has experienced a dramatic population boom but remains an area with insufficient access to recreation opportunities. Changes in recreation preferences due to demographic shifts in California’s cultural make-up could also cause capacity issues if the types of recreation resources that serve the preferences of growing ethnic groups are not available, especially in disadvantaged communities.

Economic changes can have a major impact on visitor demand and availability of recreation facilities. In a depressed economy, people have less money to spend on activities and vacations. They tend to recreate closer to home, creating increased demand on public facilities near population centers. If recreation providers are also operating with reduced budgets, they may need to increase fees to an extent that activity costs become an access barrier for low-income residents at the same time that demand is increasing.

A lack of recreation facilities and safety programs in urban areas limits youth access to the activities in Table 26-3. While today’s youth express an interest in many types of recreation, they may not know how to safely enjoy these activities. A 2007 study found that inexperience was the most common cause (67%) of personal watercraft accidents involving youth operators. Excessive speed was a factor in 57% of the accidents, followed by inattention (53%).

PLACEHOLDER Table 26-3 California Youths’ Top Rated Activities That They Would Like to Do More Often

Any draft tables, figures, and boxes that accompany this text for the advisory committee draft are included at the end of the chapter.]

Examples

- Clear signage and safe public access points along California’s navigable waterways increases recreational opportunities while minimizing private land conflicts. The Siskiyou County Sheriff declared the Scott River non-navigable in September 2011 and therefore not available for public use. When citizens complained, the sheriff consulted with county counsel and reversed his decision.
- Bringing nature back into neighborhoods and creating parkland and recreational opportunities in densely populated urban areas increases access. A section of the drainage pipe was removed from under Marsh Street Park. The ground was then lowered so that water could be filtering urban runoff. The park is adjacent to the Los Angeles River. This ‘daylighting’ of an underground stream and converting the water channel to a more natural environment has increased the recreation opportunities in this underserved area.
- Coordination between recreation and water management professionals and with urban land-use management strategies can expand the availability of water-dependent recreation resources. The Secretary of the Interior highlighted both the San Joaquin River Restoration Program and the Los Angeles and San Gabriel River trail improvements as “among the highest investments in the nation to support a healthy, active population...and create travel, tourism and outdoor-recreation jobs” in October, 2011.
- Expanding recreation safety education in urban schools increases safe access. The California Department of Boating and Waterways’ Boating Safety Education Program educates thousands of school age children through their AquaSMART outreach program, distributing millions of copies of boating safety literature (Cal Boating, 2009a, 2009b).
- “Nature Deficit Disorder,” explained in Richard Louv’s book *The Last Child in the Woods* (2005), can be addressed by creating opportunities for recreation activities listed in the California Children’s Outdoor Bill of Rights (CRRPT, 2012). The water-dependent activities that every child should experience by their fourteenth year include: learn to swim, go fishing and go boating.

Climate Change

Climate change provides both opportunities, as discussed above, and challenges for California’s recreation lands and programs. Not only does it affect recreational activities that are water-dependent, including boating, fishing, swimming, shoreline hiking, and even winter sports (e.g., skiing and ice skating), it also will alter the management of and demand for these recreation resources. As California’s climate continues to change, existing recreational facilities situated along our rivers, reservoirs and beaches may be impacted first. Sea level rise, changes in precipitation, temperature, and water levels, and reservoir management all affect waterside recreational opportunities and attendance. As temperatures increase, more people seek water-dependent recreation for cooling, which in turn creates for crowded conditions, less available parking, more stress on water conditions, and increased trash. During the winter season, less snow and more rain will fall at lower elevations in some of the mountain ranges and, thus, reduce available areas for winter recreational activities. Higher fuel prices and other potential strategies for reducing greenhouse gases may also change recreation preferences and the affordability of traveling to remote recreation areas. This may increase recreational demand close to population centers and reduce recreation in wilderness areas and at remote reservoirs. However, it is unclear how this change might intersect with current unmet demand and an increasing population.

Furthermore, less overall rain in a region will lead to lower lake and stream levels and, combined with higher temperatures, will impact aquatic, riparian, and shoreline ecosystems. Such changes could result in decreased populations of edible fish and more pollutant accumulation in fish tissues and, thus, impact recreational anglers, as well as subsistence fishers. Less water will also add stress to riparian habitats, which provide shade for streams, as well as recreationists. On the other hand, more intense rain events could localize pollutants, such as sediments, into recreational lakes and streams, increase instability of recreation sites due to infrastructure failure (e.g., sloughing of banks and erosion of trails), and impact public safety. Changes in water levels also can impact the navigability of waterways and public access. Rising sea levels, more intense wave actions, and changes in beach replenishment patterns may squeeze coastal recreation bounded by development and transportation systems and will damage the coast and its beaches, creating a higher need for coastal protection. Armoring coastlines and bays pose a particular threat to recreational access and beach sustainability. Developing adaptation strategies to prepare for these impacts will require significant planning and collaboration with multiple agencies.

As these changes to the environment continue to occur and affect water-dependent recreation (shown in Table 26-4), recreation demands will shift to accommodate new climatic conditions and more strain will be put on the other management strategies, such as ecosystem restoration and water treatment. All of the above will increase costs for maintenance, restoration, and development and will impact the quality and availability of the recreation experience.

PLACEHOLDER TABLE 26-4 Climate Change Impact

[Any draft tables, figures, and boxes that accompany this text for the advisory committee draft are included at the end of the chapter.]

Adaptation

Adaptation is a key element in preparing for the effects of climate change. Water-dependent recreation provides an avenue for residents to seek cooler environments to cope with heat, and in turn, provides health, mental, and other benefits. This type of recreation can also be situated in buffer lands that serve multiple uses to adapt to climate change, such as capturing flooding during storm events while providing recreation during drier seasons. However, with changes in climate, there will be stress on water systems, so a balance of competing uses must be taken into account to continue to provide clean drinking water to a growing population, suitable water for agricultural production and other industrial uses, as well as water for the diverse water-related ecosystems in California. As indicated earlier, research is essential for understanding the impacts of both population growth and climate change and is an important step towards addressing California's water-dependent recreation needs.

When implementing this regional management strategy, it is important to investigate existing opportunities, such as opening school pools for local residents during weekends and increasing shading around existing recreation sites. Planners should take advantage of providing education and outreach at existing facilities to inform and involve the public on what they can do to adapt to and mitigate for climate change. An education and outreach program should stress a multi-benefit approach. Managing for floods, water supply, and water quality, and restoring greenways and open space can be integrated into a water-dependent recreation strategy not only to address sustainability and ecosystems, but also to adapt to climate change. In pursuing water-dependent recreation, one should also adapt this strategy itself to

climate change, as indicated below, to ensure that existing and new facilities are resilient to these environmental changes.

Mitigation

Mitigation is accomplished by reducing or offsetting greenhouse gas emissions in an effort to lessen contributions to climate change. Water-dependent recreation provides multiple value-added benefits that address climate change. Providing local opportunities for water-dependent recreation encourages residents to use less carbon-intensive forms of transportation, such as running or biking. Creating more localized water-dependent recreation facilities in urban areas can reduce the amount of storm water runoff, increase groundwater recharge rates and wastewater filtration opportunities, filter roadway pollution, and increase carbon sequestration, thereby reducing the energy needed to accomplish these tasks through more active measures. Mitigation strategies also should include methods to limit the impacts of visitors, to reduce greenhouse gas emissions during park development and operation, and to incorporate existing federal, state and local climate change strategies into water-dependent recreation areas.

Examples:

- Sewage treatment systems are often near waterways and beaches at the lowest elevation of parks. Restrooms protect water quality and public health, so the lack of sewage treatment can require closing down campgrounds and picnic areas, too. California State Parks is preparing climate adaptation strategies to guide development in beachfront parks subject to sea level rise.
- As coastal recreation areas become damaged and submerged due to rising sea levels, recreationists may select inland destinations more frequently, creating an increased demand for inland water facilities. As reservoir levels drop, there may be a need to emphasize river recreation, such as through implementing California State Parks Central Valley Vision for increased river access and water trails for rafters and boaters (CSP, 2008).

Lack of Funding

Financing influences the ability to address most outdoor recreation issues, including water-dependent recreation. Funding issues fall into four categories: (1) research and planning (2) acquisition and development of new recreational sites, (3) operation and maintenance, and (4) the “beneficiaries pay” principle.

1. Research is critical to discerning recreation trends. California State Parks conducts some research on statewide recreation trends; however, most research is funded by manufacturers of recreation equipment or special interest advocacy groups, or limited in scope to particular uses or regions. Impartial research provides valuable guidance in order to most efficiently serve the public’s needs, but public funding is scarce. Applying research findings requires planning, but funding for this step is often difficult to secure, even as California’s growing population puts additional pressures on existing recreation resources.
2. When dam, reservoir, levee or canal projects are being planned or upgraded, funding to include land acquisition and recreational facility development such as boat ramps, fishing access points and picnic areas may not be included. One reason is that recreation beneficiaries may be different from the water project beneficiaries, requiring complex funding mechanisms. This is a significant issue at the State Water Project. The Davis-Dolwig Act speci-

fies that water contractors shall not bear the cost of recreational enhancements. The State has struggled to develop other funding sources to meet the recreation mandates in the Water Code.

3. Publicly-owned recreation facilities strive to keep entrance fees affordable to all segments of the population, so they often cost more to operate than they generate in entrance, rental, service and sales revenues. This operational deficit must be funded with public dollars. Because of public funding reductions, and the difficulty of fairly assessing all beneficiaries, many water-dependent recreation facilities are aging and suffer from a lack of maintenance. As facilities age and are removed from service, recreation opportunities are reduced. Less attendance translates into reduced revenues, further reducing opportunities. Without an infusion of capital, recreation opportunities and the benefits they bring to the community, are lost.

Without reliable funding, it is difficult for recreation providers to deliver quality, consistent and relevant facilities and services to meet growing demand. Many park and recreation providers, faced with leaner budgets, have reduced programs and operating costs, raised fees, reduced or eliminated services, delayed equipment purchases, as well as deferred land acquisition, facility developments, and rehabilitation and renovation of aging infrastructure. Inconsistent funding also reduces the willingness of many service providers to offer new programs even as the population increases and becomes more diverse.

4. Public open space lands along our reservoirs, rivers and coastline, and in our snowy mountains and foothills offer numerous benefits, yet sometimes the entire management costs are expected to be borne through recreational user fees. Cost-benefit analyses that encompass the full range of benefits and beneficiaries would clarify the appropriate funding strategies.

Examples

- Operational deficits (the difference between revenues and expenses) at SWP recreational units operated by California State Parks are as high as \$2.6 million annually.
- Eighty percent of California's hydropower dams are regulated through licenses issued by the Federal Energy Regulatory Commission. One half of those facilities (150 dams) are scheduled to be relicensed in the next 15 years. FERC licenses contain terms and conditions to protect or improve recreation, fisheries, wildlife, water quality, wetlands, and/or cultural resources. For instance, when the Sacramento Municipal Utility District (SMUD) filed a FERC license application for its Upper American River Project, they proposed to spend approximately \$12.5 million over the life of the license, including a new recreation plan to enhance recreation throughout the project boundary by reconstructing facilities. The application included implementation of a forest service roads maintenance plan that will coordinate access to recreational opportunities. SMUD also proposed to incorporate releases of additional water, from Ice House Dam, during the three weekends after Labor Day during "wet" and "above normal" water years, for whitewater recreation (SMUD, 2005, 2009).

- Local taxes may be more acceptable to voters when tied to specific projects that benefit them. East Bay Regional Parks District is funded, in part, by a homeowners tax of \$10 annually per \$100,000 of assessed valuation. This tax funds popular water-based recreation improvements at Big Break Regional Shoreline, along the San Francisco Bay Trail, in the Delta and in many other areas of Contra Costa County. The list of planned projects and benefits was included in the campaign literature for this measure, which was approved by voters in 2008 (<http://www.ebparks.org/WW>).

Loss of Cultural Resources

Low water levels and stream flows and impacts to fish habitat from dams and water transfer diversions can prevent Native Americans from participating in traditional cultural activities such as spear- and net-fishing. A water diversion on the Klamath River has led to conditions that caused an unprecedented fish-kill of over 33,000 salmon, steelhead and other fish species. Many other traditional activities, such as ceremonial dancing and basket making, are also dependent on the water flows of specific rivers and streams. Regalia and basket making resources, such as bear grass and willows, are important cultural resources which are dependent on the health of California's waterways.

Recreational water use can lead to the pollution, demolition, and desecration of cultural resources, such as sacred sites, religious materials, and wildlife. Recreational use of waterways make it difficult and/or impossible for Tribes to access important materials located near streams, rivers, lakes and beaches. It is important to ensure that cultural groups have access to the resources necessary to preserve and celebrate their heritage.

Greatly reduced and sustained low reservoir water levels expose archaeological and cultural sites, thereby jeopardizing the cultural resources as well as requiring restrictions to public access in those areas. Some recreation activities are being curtailed to protect the cultural resources.

Solutions to Address These Issues

- Implementing the recommendations in the National Research Council's study findings that fair and science-based flow levels that provide for fish recovery can be part of a broader solution for the fish-kill problems in the Klamath Basin (NRC, 2008; The National Academies, 2007). Their suggested long-term solution includes removal of the lower four Klamath River dams, a voluntary program to buy back water rights from Klamath irrigation interests and return these flows to rivers and streams, and a large-scale wetlands restoration program, starting with an end to commercial agricultural development on Tule Lake National Wildlife Refuge.
- To ensure that the Chumash Indians have access to the resources necessary to preserve and celebrate their heritage, the Wishtoyo Foundation helped fund a stream habitat restoration project at Nicholas Canyon Creek near a reconstructed Chumash village. Since water and plants play a central role in Chumash culture, teachings about creek and riparian ecosystems are incorporated into the Chumash village interpretive program.
- Government agencies should consult with Tribes in order to receive their input regarding the impact and effects that water-dependent recreation have on cultural resources, religious practices, and subsistence fishing. This should be done on a regional basis in order to mitigate damages to cultural resources specific to the affected area.

Natural Resources Degradation

Natural resource values often define the character and aesthetic appeal of water-dependent recreation, making it desirable and interesting to visitors. For instance, white-water rafting occurs where rivers and streams descend rapidly through the landscape. Swimming requires good water quality while hiking is popular along vegetated rivers and streams. Fishing often depends on the seasonal availability of game fish, water quality and quantity, riverine habitat qualities and access. Degradation of these natural resources can affect the recreation experience.

Recreation is often a concurrent use, not a sole use, of many open space lands so a wide range of natural resource management actions can impact recreational experiences. Pollution or withdrawal of surface waters can limit visitor use and enjoyment of waterway and lakes. Dams and other flood management measures can impact recreation through reducing the fishery, making navigation more difficult, changing bank characteristics and reducing native habitat. Water infrastructure and bank protection measures can decrease the sediment supply to the coast, narrowing beaches and diminishing coastal access and recreation opportunities. Climate change can exacerbate existing conditions, making it more difficult to manage floods while ensuring an adequate water supply. More frequent and pro-longed drought events can further degrade the natural resources and provide an avenue for invasive species to take over natural areas.

Without adequate recreation resource management, outdoor recreation visitors can also threaten ecosystem functions, disrupt and displace wildlife, or degrade the natural, environmental, and aesthetic quality of an area. Visitors unfamiliar with ecological processes or environmental ethics are often unaware of the consequences of their actions.

Invasive Species Impacts

The expansion of invasive species, particularly from the San Francisco Estuary and the Colorado River, could have far reaching effects on California's ability to provide adequate water to its constituents.

Recreational uses of waterways, as well as the State Water Project, have already been negatively affected in the Delta region by invasive plant species. Invasive aquatic plants such as *Egaria densa* and water hyacinth limit recreational and commercial vessel navigation and passage, restrict water flows, clog water intakes, and entrap sediments. These non-native plants potentially decrease productivity of Delta fisheries by hindering and impeding anadromous and pelagic fish migration, competing with native vegetation, causing anoxic (low oxygen) conditions and threatening water quality. These invasive plants also increase agricultural pumping maintenance requirements and other associated costs. The expansion rate of these invasive species in the Delta is approximately 10 percent per year. Invasive plants also are opportunistic and are able to occupy areas stressed by drought, fire, and other conditions caused by changes in climate. Once established, these plants not only outcompete native vegetation, they tend to utilize more water than natives and can create greater fire and flooding hazards in riparian areas. (Cal Boating)

The quagga mussel is a close relative of the zebra mussel and both have similar environmental and economic impacts. Quagga mussels were first found in the Colorado River system in January 2007 and later were found in San Diego and Riverside counties. Zebra mussels were found in a San Benito County reservoir in January 2008. Recreation users can inadvertently spread these invasive species to other water

bodies, adversely affecting natural resources, native species, and maintenance costs. They can be easily transported by a boat or its trailer. Boat engines and other parts of the craft also can carry mussel larvae—called veligers—which can spread into waterways and lakes. The spread of the mussels threatens water delivery systems, hydroelectric facilities, agriculture, recreational boating and facilities, and the environment in general, in some of the following ways:

- Reduces fish populations
- Limits or eliminates recreational opportunities to boaters
- Damages boat engines by blocking the cooling system
- Jams boat steering equipment
- Increases drag at the bottom of a boat, wasting fuel and reducing speed
- Requires scraping and repainting of boat bottoms
- Colonizes boat ramp and boat docks

Invasive species control is increasing park operational costs, often borne by recreationists. (Cal Boating)

Examples

- The Santa Ana and Santa Clara Rivers have been invaded by the giant reed (known as *Arundo donax*), on which much resources and money have been spent in trying to eradicate this species from recreational waterways.
- The East Bay Municipal Utility District's Pardee, Camanche, San Pablo, Lafayette, Chabot, and Briones reservoirs have restricted access, requiring all incoming boats to be inspected. Those boats coming from outside California, Southern California, San Benito or Santa Clara counties and those coming from other quagga mussel high risk areas are being turned away (EBMUD, 2009).
- A multi-agency taskforce that includes the Departments of Fish and Game, Water Resources, Boating and Waterways, Food and Agriculture, Parks and Recreation and multiple federal partners have developed a boater education program aimed at preventing the spread of quagga and zebra mussels. The campaign asks boaters to "Clean, Drain and Dry" their boats before moving from one water body to another (DFG, 2009a, 2009b; Cal Boating, 2008a, 2009c).

Water Quality Impacts

Water quality can both affect and be affected by water-dependent recreation. California has a variety of water-dependent recreation opportunities with differing levels of public contact-- both as a consequence of impaired water quality and the potential impact of recreational activities on domestic water supplies. Water quality issues may be used to determine levels of recreation access—from prohibiting all public access, prohibiting any body contact with the water, to allowing swimming, fishing, paddling and/or motor boating.

Untreated or partially treated sewage released into the ocean has led to highly publicized closures of public beaches, however, monitoring is woefully underfunded (<http://brc.healthebay.org/>). Fertilizers and chemicals from agricultural runoff also contribute to poor water quality. With the potential for flashier floods and frequent extreme storm events due to changes in climate, increased erosion of streambanks and siltation of waterways are anticipated. Contaminated lakes, rivers, and streams, as well as eroded banks and trails, not only present both health and safety risks to those participating in water-contact and non-contact water recreation, but can significantly diminish the recreation experience. Poor water quality can

cause marina closures to protect both the users and the environment, such as pollution-related beach closures or navigable waterway barriers. Water diverted from natural streambeds causes higher water temperatures that cannot sustain healthy fisheries or dilute pollutants and affects opportunities for whitewater boating.

Water-dependent recreation can also negatively affect water quality. Human-source contamination, such as untreated sewage and petroleum products discharged from houseboats and other pleasure craft, can be a significant problem to reservoirs storing drinking water.

Examples

- The organization Heal the Bay has been publishing an Annual Beach Report Card for 21 years, that identifies impaired beaches. (<http://brc.healthebay.org>).
- The State Water Resources Control Board is currently proposing a statewide policy for bacterial standards for water contact recreation in the fresh waters of California. Elements of the final policy may include a revised indicator organism (such as *E. coli*), risk protection level, and expansion and standardization of bacteria control implementation (SWRCB, 2008).

Water Quantity Changes

Dramatically changing water levels impact the availability of different recreation opportunities. Low levels can separate boat ramps and launches from the water's edge. Folsom Lake and Lake Oroville are examples where changing water levels often affect recreation opportunities. In the summer of 2008, the water level at Folsom Lake was so low a 5-mile-an-hour speed limit was imposed on all vessels and all the boat ramps were closed.

Low river flows can block public access, eliminating opportunities to boat or fish. Water diverted from natural streambeds affects opportunities for whitewater boating. Early summer season water transfers and prolonged drought periods can cause extremely low water levels at reservoirs later, impacting the availability of recreation opportunities.

Examples

- River restoration required by FERC relicensing included changes to hydropower operations on the Middle Fork of the Stanislaus and Feather Rivers, that resulted in increased base flows to improve habitat and enhance overall river health, modified flows to mimic natural fluctuations, and improved recreational flows and access sites.
- Lake Del Valle had unusually low water levels in the spring of 2012, which surprised the recreation provider when popular swimming beaches were rendered unavailable. DWR doesn't release planned water levels at SWP reservoirs, so East Bay Regional Park District was not able to collect projected revenues, notify recreationists in advance, or reschedule appropriate staffing or events in advance. (SWP Recreation Coordinating Committee meeting, May, 2012)

Inadequate Agency Coordination

Funding deficiencies and impacts to recreation resources are exacerbated by the lack of coordination among agencies, both those who manage water resources and those who provide recreational services. Agencies are too often limited in scope and effectiveness in recognizing and mitigating trends affecting

resource conditions, particularly those outside their immediate jurisdiction. While partnerships and cooperation among agencies, organizations and individuals have grown, efforts at the watershed or landscape level are often fragmented, and opportunities are missed to achieve broader goals, placing both resources and the public at risk. Poorly coordinated hydroelectric and flood management practices at reservoirs can impact upstream and downstream recreation opportunities. A lack of coordination between the managing agencies and the recreation providers can result in unreliable water recreation resources, unbudgeted financial implications, staffing problems and missed partnerships that could provide expanded recreation opportunities.

Examples

- The Integrated Regional Water Management (IRWM) planning process is aimed at securing long-term water supply reliability within California by first recognizing the inter-connectivity of water supplies and the environment and then pursuing projects yielding multiple benefits for water supplies, water quality, and natural resources. The IRWM planning process must also address reducing greenhouse gas emissions and being resilient to climate change, which in turn provide an opportunity for communities to identify water-dependent recreation strategies that assist in mitigating for and adapting to climate change. Adding recreation coordination within the IRWMs will help leverage existing water-dependent recreation resources, increase dependable opportunities and disperse recreation demand.
- The Santa Ana Watershed Project Authority has been working with the Crest-To-Coast Partnership to complete the Santa Ana River Trail and add parkway elements to the river. The effort is funded by the counties and cities in the watershed and by environmental groups interested in completing a 110-mile trail system.
- California State Parks is proposing partnerships between land-owning agencies in the Central Valley and the Delta to concentrate intensely developed recreation resources in one area to minimize impacts to natural resources. (www.parks.ca.gov/deltarecreation, www.parks.ca.gov/centralvalleyvision)

Recommendations to Facilitate Water-Dependent Recreation

Lack of Access

1. The State Lands Commission could lead an education and identification effort to clarify existing legal points of river access.
2. Recreation and water management agencies need to partner with schools to provide public safety education that includes injury and drowning prevention programs aimed at youth from urban and low income communities.
3. In developing water-dependent recreation opportunities, jurisdictions should consider the needs of the public and low income communities, and increased population and diversity as identified in statewide planning documents such as the California Outdoor Recreation Plan and the Central Valley Vision.
4. Use existing data and new surveys to determine recreational needs that might be met by incorporating recreation more fully into new state and regional water project planning.

5. Collect data on visitation rates versus reservoir water levels and downstream flow rates, and use this data to help optimize the timing of water that is released or held for recreation, to the degree possible consistent with other water needs.
6. Develop partnerships with universities to coordinate the monitoring of public recreation use, equipment, and emerging water-dependent recreation trends.
7. Create partnerships with education providers to educate youth about outdoor ethics, and preserving and protecting natural resources. Examples of progress on this recommendation include work being done by the Biodiversity Council and Stewardship Council.
8. Incorporate recreation facilities in the planning design of new floodways, levees, and/or other water facilities.

Climate Change

9. Create/participate in a climate change network of agencies that keeps members abreast of new data and strategies and provides opportunities for collaboration.
10. Conduct climate change adaptation planning for each region of the state. Create a GIS-based tool to identify areas and resources vulnerable to climate change, such as low elevations vulnerable to sea-level rise and areas with plant and wildlife sensitive to drought.
11. Identify a procedure to incorporate climate change assessments within all infrastructure planning, budgeting, and project development.
12. Create facilities to accommodate environmental and management changes, including moveable facilities such as floating campsites and restrooms. Conduct systematic assessments of potential impacts of climate change on recreation resources and identify suggested adaptations.
13. If reservoir levels drop, there may be a need to emphasize river recreation, such as through implementing California State Parks Central Valley Vision for increased river access and water trails for rafters and boaters (CSP, 2008).

Lack of Funding

14. Develop funding streams for impartial recreation research.
15. Update the Davis-Dolwig Act provisions to more fully fund water-dependent recreation enhancements at state-authorized water projects.
16. Work closely with hydroelectric dam operators facing FERC relicensure to integrate recreational funding needs.
17. Pursue mitigation and environmental enhancement funding for recreation facilities through grant programs, such as those associated with the FloodSAFE program.
18. Quantify how reduced water-dependent recreation opportunities can impact local economies, such as low lake/reservoir levels occurring during peak visitation periods that affect visitor spending.
19. Develop more realistic cost/benefit analyses which allow appropriate cost-sharing among all beneficiaries of water projects.
20. Develop more stable local funding sources.

Cultural Resources

21. Research, identify and mitigate the impact of low water levels and stream flows to fish habitat from dams and water transfer diversions that prevent Native Americans from participating in their traditional cultural activities.
22. Continue inventories of archaeological and cultural resources associated with water facilities to identify and mitigate those in danger of exposure and destruction due to reduced and sustained low reservoir water levels and recreational use.

Natural Resources Degradation

23. Conduct flow assessments on the major river systems to analyze the impacts of flow levels on wildlife, habitats and recreation opportunities.
24. Evaluate, and periodically re-examine, scientifically valid studies of the carrying capacity of proposed and existing sites for water-dependent recreation to help prevent degradation of water quality and wildlife habitat. Examine and utilize data collected by other agencies, such as the US Bureau of Reclamation, US Army Corps of Engineers, and the Federal Energy Regulatory Commission, such as the results of FERC relicensing studies.
25. Maintain and restore vegetation along rivers and streams.
26. Restore fisheries.
27. Consider river naturalization or de-channelization to provide urban open space along the river or canal for recreation.
28. Create flood control, water transfer and storage facilities that are closer to natural ecological systems and accommodate recreational access.

Invasive Species Impacts

29. Inventory water facilities and measure their vulnerability to specific invasive species.
30. Prioritize and develop preventive measures and response strategies for the most at-risk facilities.
31. Develop funding to expand monitoring.

Water Quality Impacts

32. Improve water quality by educating residents and business in the watershed.
33. Make real-time water quality information for surface waters more accessible on line and at recreation sites.
34. Develop strategies to reduce impacts to water quality of water recreation vehicles – such as reduced pollution of gasoline engines.
35. Enter into agreements with other agencies and governing bodies, as appropriate, to secure their cooperation in maintaining or restoring the quality of water resources.
36. Take proactive measures to limit sea level rise impacts to waterside sewage facilities.

Water Quantity Changes

37. Develop closer working relationships between water management agencies such as DWR and BOR, and water-dependent recreation providers such as EBRPD and CSP, so that recreation planning is better incorporated into water management planning.

Agency Coordination

38. Promote and establish effective partnerships among federal agencies, State and local governments, California Tribes, and the private sector for operation, maintenance, and law enforcement at water-dependent recreation sites.
39. Work to maintain consistency between the Water Plan and other agency reports such as the California Outdoor Recreation Plan and all state-authorized water projects.
40. Require all IRWM Programs and projects to include a recreation component or justify why recreation cannot be accommodated.

Water-Dependent Recreation in the Water Plan

[This is a new heading for Update 2013. If necessary, this section will discuss the ways the resource management strategy is treated in this chapter, in the regional reports and in the sustainability indicators. If the three mentions aren't consistent, the reason for the conflict will be discussed (i.e., the regional reports are emphasizing a different aspect of the strategy). If the three mentions are consistent with each other (or if the strategy isn't discussed in the rest of Update 2013), there is no need for this section to appear.]

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